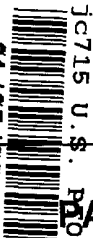


01/07/00



Jc715 U.S. PTO



A

**UTILITY
PATENT APPLICATION
TRANSMITTAL**
(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No. 862.3202

First Named Inventor or Application Identifier

MASAHIRO IWADATE

Express Mail Label No.

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO:Assistant Commissioner for Patents
Box Patent Application
Washington, DC 202311. ☒ Fee Transmittal Form
(Submit an original, and a duplicate for fee processing)2. ☒ Specification Total Pages **36**3. ☒ Drawing(s) (35 USC 113) Total Sheets **18**4. ☒ Oath or Declaration Total Pages **1**

- a. ☒ Newly executed (original or copy)
b. ☐ Unexecuted for information purposes
c. ☐ Copy from a prior application (37 CFR 1.63(d))
(for continuation/divisional with Box 17 completed)
[Note Box 5 below]

i. ☐ **DELETION OF INVENTOR(S)**
Signed Statement attached deleting
inventor(s) named in the prior application, see
37 CFR 1.63(d)(2) and 1.33(b).

5. ☐ Incorporation By Reference (useable if Box 4c is checked)
The entire disclosure of the prior application, from which a copy of
the oath or declaration is supplied under Box 4c, is considered as
being part of the disclosure of the accompanying application and is
hereby incorporated by reference therein.

6. ☐ Microfiche Computer Program (Appendix)7. Nucleotide and/or Amino Acid Sequence Submission
(if applicable, all necessary)

- a. ☐ Computer Readable Copy
b. ☐ Paper Copy (identical to computer copy)
c. ☐ Statement verifying identity of above copies

Jc564 U.S. PTO
09/479214

01/07/00

ACCOMPANYING APPLICATION PARTS8. ☒ Assignment Papers (cover sheet & document(s))9. ☐ 37 CFR 3.73(b) Statement ☐ Power of Attorney
(when there is an assignee)10. ☐ English Translation Document (if applicable)11. ☐ Information Disclosure Statement (IDS)/PTO-1449 ☐ Copies of IDS Citations12. ☐ Preliminary Amendment13. ☒ Return Receipt Postcard (MPEP 503)
(Should be specifically itemized)14. ☐ Small Entity ☐ Statement filed in prior application
Statement(s) Status still proper and desired15. ☐ Certified Copy of Priority Document(s)
(if foreign priority is claimed)16. ☐ Other: _____

17. If a CONTINUING APPLICATION, check appropriate box and supply the requisite information:

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No. _____**18. CORRESPONDENCE ADDRESS**☒ Customer Number or Bar Code Label

05514

(Insert Customer No. or Attach bar code label here)

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NAME

Address

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CLAIMS	(1) FOR	(2) NUMBER FILED	(3) NUMBER EXTRA	(4) RATE	(5) CALCULATIONS
	TOTAL CLAIMS (37 CFR 1.16(e))	16-20 =	0	X \$ 18.00 =	\$ 0.00
	INDEPENDENT CLAIMS (37 cfr 1.16(b))	2-3 =	0	X \$ 78.00 =	\$ 0.00
	MULTIPLE DEPENDENT CLAIMS (if applicable) (37 CFR 1.16(d))			\$ 260.00 =	\$ 0.00
				BASIC FEE (37 CFR 1.16(a))	\$ 690.00
	Total of above Calculations =				\$ 690.00
	Reduction by 50% for filing by small entity (Note 37 CFR 1.9, 1.27, 1.28).				
	TOTAL =				\$ 690.00

19. Small entity status

- a. ☐ A Small entity statement is enclosed
- b. ☐ A small entity statement was filed in the prior nonprovisional application and such status is still proper and desired.
- c. ☐ Is no longer claimed.

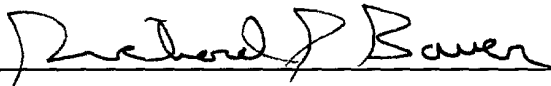
20. ☒ A check in the amount of \$ 690.00 to cover the filing fee is enclosed.

21. ☒ A check in the amount of \$ 40.00 to cover the recordal fee is enclosed.

22. The Commissioner is hereby authorized to credit overpayments or charge the following fees to Deposit Account No. 06-1205:

- a. ☒ Fees required under 37 CFR 1.16.
- b. ☐ Fees required under 37 CFR 1.17.
- c. ☐ Fees required under 37 CFR 1.18.

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

NAME	Richard P. Bauer - Reg. No. 31,588
SIGNATURE	
DATE	January 7, 2000

DS\RPB\CBW\lmj

TITLE OF THE INVENTION

IMAGE OUTPUT APPARATUS AND METHOD OF CONTROLLING SAME

5

BACKGROUND OF THE INVENTION

This invention relates to, e.g., a printer, an image output apparatus which includes the printer and a method of controlling the apparatus. More particularly, 10 the invention relates to an image output apparatus adapted to cope with a case in which a fatal error occurs when an image is formed, and to a method of controlling this apparatus.

In addition to single-function printers, there have 15 been proposed multifunction apparatus equipped with an image reading function such as that of an image scanner and a facsimile communication function, whereby a single apparatus provides a plurality of image input/output functions such as a copy function, facsimile function 20 and printing function.

If data described in page description language (referred to as "PDL data" below) is input when such a printer or multifunction apparatus is used as an image output apparatus, often an image is formed and output on 25 the basis of this data. If a fatal error occurs in such an image output apparatus owing, say, to the inclusion

of a command that cannot be interpreted in the entered
PDL data, it is proposed to shut down all functions from
the moment the error occurs, notify the user of this
fact and warn the user so that the user will turn the
5 main power supply off and on.

If the above-described fatal error occurs in a
multifunction apparatus having multiple image
input/output functions, the main power supply must be
turned off and on in order to recover from the error.
10 This means that if another function is being executed
concurrently with the function in which the error
occurred, this other function also is suspended by
turning off the main power supply. For example, assume
an instance where printing processing develops a fatal
15 error, e.g., an error in which a command that cannot be
interpreted is received, when the reception and printing
of PDL data are being executed in parallel with
facsimile reception. If the main power supply is not
shut down in such case, recovery of the printing
20 function will not take place. The problem is that
facsimile reception also must be interrupted.

SUMMARY OF THE INVENTION

25 Accordingly, an object of the present invention is
to provide an image output apparatus, as well as a

method of controlling the same, in which even when the printing function develops a fatal error, the printing function can be restored in such a manner that functions not utilizing the printing function are unaffected.

5 According to the present invention, the foregoing object is attained by providing an image output apparatus comprising image generating means for generating image data based upon input data, and control means for receiving and controlling output of the image
10 data that has been generated by the image generating means, wherein the control means detects occurrence of an error in the image generating means and, when an error has been detected, issues the image generating means an order to execute initialization.

15 In a preferred embodiment, the image generating means detects the occurrence of a fatal error and so notifies the control means, whereby the control means detect the occurrence of an error in the image generating means.

20 In a preferred embodiment, the control means judges that an error has occurred in the image generating means if an instruction that has been transmitted to the image generating means is not responded to in a predetermined period of time.

25 In a preferred embodiment, the control means, which has detected the occurrence of an error in the image

generating means, halts communication with the image
generating means and gives notification of occurrence of
the error by a display or sound before the order to
execute initialization is issued to the image generating
5 means.

In a preferred embodiment, the apparatus further
comprises conversion means for reading in an image and
converting the image to image data.

In a preferred embodiment, the apparatus further
10 comprises means for sending and receiving image data via
a communication line.

Other features and advantages of the present
invention will be apparent from the following
description taken in conjunction with the accompanying
15 drawings, in which like reference characters designate
the same or similar parts throughout the figures
thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

20

Fig. 1 is a block diagram illustrating an example
of the overall construction of an image processing
apparatus according to an embodiment of the present
invention;

25 Fig. 2 is a sectional view showing an example of
the construction of a scanner and printer;

Fig. 3 is a block diagram showing an example of the details of construction of the scanner;

Fig. 4 is a block diagram showing an example of the details of construction of an image input/output

5 controller;

Fig. 5 is a block diagram showing an example of the details of construction of a formatter;

Fig. 6 is a block diagram showing an example of the details of construction of a facsimile unit;

10 Fig. 7 is a diagram showing signal lines between the formatter and the image input/output controller;

Figs. 8A to 8D are diagrams showing the timings of a RESET* signal, SPRDY* signal and MPRDY* signal;

Fig. 9 is a diagram conceptually illustrating
15 exchange of commands between the formatter and the image input/output controller;

Fig. 10 is a diagram conceptually illustrating a communication protocol having an ordinary layer structure;

20 Figs. 11A and 11B are diagrams showing the data structure of a transport layer;

Fig. 12 is a diagram illustrating a communication sequence in a logical port control panel between the image input/output controller and formatter;

25 Figs. 13A to 13H are diagrams showing the data structures of commands used in the communication

sequence of Fig. 12;

Fig. 14 is a diagram showing a process between the formatter and image input/output controller in a case where a service call has been generated in the

5 formatter;

Fig. 15 is a diagram showing the appearance of a control panel;

Figs. 16A to 16C are diagrams illustrating examples of initial screens of various mode functions;

10 Figs. 17A to 17D are diagrams illustrating an example of the flow of screens in a case where a service call has been generated in the formatter; and

Fig. 18 is a diagram illustrating processing executed in the image input/output controller in a case
15 where a print mode key has been pressed.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[First Embodiment]

20 Fig. 1 is a block diagram illustrating the construction of an image processing apparatus 100 according to a first embodiment of the present invention.

As shown in Fig. 1, a scanner 1 reads a document
25 and outputs image data conforming to the document image to a printer 2 or image input/output controller 3.

The printer 2 prints an image on printing paper based upon image data that enters from the scanner 1 or image input/output controller 3.

The image input/output controller 3 is connected to
5 the scanner 1, the printer 2, a formatter 4, a facsimile unit 5 and a control panel 6 and functions as a main controller for exercising overall control of these components.

The formatter 4 generates image data (bitmap data),
10 which can be printed by the printer 2, from image data (e.g., PDL data) transferred from an information processing apparatus 7 and transfers the generated image data to the image input/output controller 3. Various information relating to the components of the overall
15 image processing apparatus 100 and the operating status thereof are transferred to the information processing apparatus 7.

The facsimile unit 5 expands compressed image data received via a telephone line, transfers the expanded
20 image data to the image input/output controller 3, compresses image data transferred from the image input/output controller 3 and transmits the compressed image data to external equipment (not shown) via a telephone line.

25 In accordance with orders from the image input/output controller 3, the control panel 6 displays

a screen for allowing the user to make various settings and reports the content of the user settings to the image input/output controller 3.

Fig. 2 is a sectional view showing an example of the construction of the scanner 1 and printer 2.

The scanner 1 has a document feeder 101 for feeding documents to a glass platen 102 one at a time from the last page of the stack and ejecting a document from the glass platen 102 whenever the reading of each document ends. When a document is transported to the glass platen 102, a lamp 103 is lit, movement of a scanner unit 104 is started and the document is scanned to expose it to light. Light reflected from the document at this time is introduced to a CCD image sensor (referred to as a "CCD" below) 109 by mirrors 105, 106, 107 and a lens 108. The image data thus read is subjected to predetermined processing and then transferred to the printer 2 and image input/output controller 3.

The printer 2 has a laser driver 221 which drives a laser emission unit 201 so that the latter will emit a laser beam based upon the image data that has been output from the scanner 1. The laser beam irradiates a photosensitive drum 202 on which is formed a latent image conforming to the laser light. A developing unit 203 causes a developing agent to attach itself to the

latent image formed on the photosensitive drum 202.

Printing paper is transported to a transfer unit 206 from a cassette 204 or 205 at a timing synchronized to the start of the laser emission, as a result of which
5 the developing agent affixed to the photosensitive drum 202 is transferred to the printing paper. The printing paper to which the developing agent has been transferred is transported to a fixing unit 207, where the developing agent is fixed on the printing paper by heat
10 and pressure supplied by the fixing unit 207. Upon passing through the fixing unit 207, the printing paper is ejected by ejection rollers 208. The ejected paper is then placed in an appropriate bin by a sorter 220, thereby sorting the multiple sheets of recording paper
15 after they are ejected.

It should be noted that the sorter 220 will place recording paper in the uppermost bin if the apparatus has not been set to the sorting mode. If the apparatus has been set to a double-sided printing mode, recording
20 paper is transported up to the position of the ejection rollers 208, the rotating direction of the ejection rollers 208 is reversed and the paper is introduced to the paper feed path again by a flapper 209. If the apparatus has been set to a multiple-printing mode, the
25 recording paper is introduced to the paper feed path again by the flapper 209 in such a manner that the paper

will not be transported as far as the ejection rollers 208. Printing paper thus re-introduced to the paper feed path is fed to the transfer unit 206 again at the above-mentioned timing.

5 Fig. 3 is a block diagram showing an example of the details of construction of the scanner 1. An image processor 111, an interface (I/F) 113, a ROM 115 and a RAM 116 are connected to a CPU bus 117 of a CPU 114 in the manner illustrated.

10 Image data output from the CCD 109 undergoes an analog-to-digital conversion as well as a shading correction in an A/D & shading unit 110. Image data that has been processed by the A/D & shading unit 110 is transferred to the printer 2 via the image processor 111 and is transferred to the image input/output controller 3 via the interface 113.

15 The CPU 114 controls the image processor 111 and the interface 113 in dependence upon the content of a setting indicated by the image input/output controller 3. For example, if a mode for performing copying after trimming processing has been designated, trimming processing is executed by the image processor 111 and the processed image data is transferred to the printer 2. If a facsimile transmission mode has been designated, image data that has been read is transferred to the image input/output controller 3 via the interface

113. The control program of the CPU 114 which exercises
such control has been stored in the ROM 115. The CPU
114 operates on the basis of this control program in ROM
115. The RAM 116 is used as a working area of the CPU
5 114.

Fig. 4 is a block diagram showing an example of the
details of construction of the image input/output
controller 3. An interface 300, a control-panel
interface (I/F) 302, an interface 303, a ROM 304, a RAM
10 305 and an image processor 306 are connected to a CPU
bus 308 of a CPU 301 in the manner illustrated.

Image data that enters from the scanner 1 is
transferred to the image processor 306 via the interface
303 and is then stored in an image memory 307. A
15 control command that enters from the scanner 1 is
transferred to the CPU 301.

Image data that enters from the formatter 4 and
facsimile unit 5 is transferred to the image processor
306 via the interface 300 and is then stored in the
20 image memory 307. Control commands that enter from the
formatter 4 and facsimile unit 5 are transferred to the
CPU 301.

Under the control of the CPU 301, these images that
have been stored in the image memory 307 are subjected
25 to image processing such as image rotation processing
and scaling processing in the image processor 306 based

upon control commands that enter from the scanner 1,
formatter 4, facsimile unit 5 and control panel 6. The
processed images are then transferred to the printer 2
via the interface 303. Alternatively, the processed
5 images are transferred to the facsimile unit 5 via the
interface 300.

If, from among the control commands that have
entered from the scanner 1, formatter 4 and facsimile
unit 5, the CPU 301 receives a command requesting a
10 display on the control panel 6, then the CPU 301 causes
the designated display content to be displayed on the
control panel 6 via the control-panel interface 302. If
the user performs an operation at the control panel 6,
information indicative of this information is input to
15 the CPU 301 via the interface 302. The CPU 301
transfers the operating information that has entered
from the control-panel interface 302 to the scanner 1,
formatter 4 and facsimile unit 5. Alternatively, the
CPU 301 executes image input/output control based upon
20 the operating information.

The control program of the CPU 301 that exercises
this control has been stored in the ROM 303. The CPU
301 operates on the basis of this control program in ROM
303. The RAM 304 is used as a working area of the CPU
25 301.

Fig. 5 is a block diagram showing an example of the

details of construction of the formatter 4. A host interface (I/F) 400, an image data generator 401, an image memory 402, an interface 403, a ROM 405 and a RAM 406 are connected to a CPU bus 407 of a CPU 404.

5 PDL data that has been sent from the host computer 7 is stored in the RAM 406 via the host interface 400 such as a LAN interface or centronics interface. The CPU 404 interprets the PDL data that has been stored in the RAM 406 and transfers data for creating a bitmap
10 image to the image data generator 401. The image data generator 401 converts the data sent from the CPU 404 to a bitmap image. The bitmap image that has been created is stored in the image memory 402.

The CPU 404 extracts the bitmap image that has been
15 stored in the image memory 402, transfers the bitmap image to the image input/output controller 3 via the interface 403 and transfers the output destination of the image to be transferred as well as a control command specifying an output setting. Further, the CPU 404
20 executes various types of control based upon information indicating operation of the control panel 6 transferred from the image input/output controller 3. For example, if an operation for clearing a receive buffer in the formatter 4 is performed at the control panel 6,
25 notification of this fact is given by the image input/output controller 3. In accordance with orders

from the image input/output controller 3, the CPU 404 clears received data that has been stored in the RAM 406.

The control program of the CPU 404 which exercises
5 such control has been stored in the ROM 405. The CPU 404 operates on the basis of this control program in ROM 405. The RAM 406 is used as a working area of the CPU 404.

Fig. 6 is a block diagram showing an example of the
10 details of construction of the facsimile unit 5. A modulator/demodulator (MODEM) 500, a buffer memory 501, a coder/decoder (CODEC) 502, an interface 503, a ROM 505 and a RAM 506 are connected to a CPU bus 507 of a CPU 504.

15 At the time of facsimile reception, data received from the telephone line is demodulated by the modem 500 and stored in the buffer memory 501. The CPU 504 extracts the data that has been stored in the buffer memory 501 and sends the data to the coder/decoder 502
20 so that the data is decoded to create a bitmap image.

The CPU 502 transfers the created bitmap image to the image input/output controller 3 and transfers the output destination of the image to be transferred as well as a control command specifying an output setting.

25 At the time of facsimile transmission, an image that has been transferred from the image input/output

controller 3 is transferred by the CPU 505 to the
coder/decoder 502 and is coded thereby, after which the
coded data is stored in the buffer memory 501. At this
time various setting information relating to facsimile
5 transmission such as a telephone number is transferred
from the image input/output controller 3 to the CPU 504.
The latter makes various facsimile transmission settings
based upon these items of information sent from the
image input/output controller 3 and then extracts the
10 transmission information, which has been stored in the
buffer memory 501. The extracted information is
modulated by the modem 500 and transferred to the
telephone line.

Display-screen and configuration information
15 relating to the operation of the facsimile unit 5 is
stored in the ROM 505 and RAM 506 in advance. The CPU
504 extracts this information as necessary and transfers
it to the image input/output controller 3 via the
interface 503. Further, the CPU 504 executes various
20 types of control based upon information indicating
operation of the control panel 6 transferred from the
image input/output controller 3. For example, if an
operation for outputting the communication management
report of the facsimile unit 5 is performed at the
25 control panel 6, notification of this is given by the
image input/output controller 3. In accordance with the

indication from the image input/output controller 3, the CPU 504 creates a bitmap image of the communication management report and transfers the bitmap image to the image input/output controller 3 via the interface 503.

5 The control program of the CPU 504 which exercises such control has been stored in the ROM 505. The CPU 504 operates on the basis of this control program in ROM 505. The RAM 506 is used as a working area of the CPU 404.

10 Fig. 15 illustrates the appearance of the control panel 6.

A main power lamp 601 lights when the power supply is turned on. A power switch (not shown) is disposed on the side face of the main body and controls the feed of
15 current to the main body. A preheat key 602 is used to turn a preheating mode on and off. A copy mode key 603 is used when a copy mode is selected from a plurality of functions. A facsimile mode key 604 is used when a facsimile mode is selected from the plurality of
20 functions. A printer mode key 605 is used when a printer mode is selected from the plurality of functions, and a copy start key 606 is used when the start of copying is designated. A stop key 607 is used to suspend or terminate copying. A reset key 608
25 operates in the copy mode as a key for restoring a standard mode. A guide key 609 is used when the

operator wishes to obtain information about the various functions available. A user mode key 610 is used when the basic configuration of the system is changed. An interrupt key 611 is used when it is desired to make a
5 copy upon interrupting a copying operation that is in progress. Numeric keys 612 are used when a numerical value is to be entered. A clear key 613 is used when a numerical value is to be cleared. There are 20 single-touch dialing keys 614 used for single-touch dialing
10 during facsimile transmission. A double cover 615 comprises two covers in which key areas corresponding to the single-touch dialing keys 614 have been cut out. A first state in which both covers have been closed, a second state in which only the first cover has been
15 opened and a third state in which both covers have been opened are sensed by a sensor switch, not shown. The operation of the single-touch dialing keys 614 is decided by these three opened/closed combinations of the covers. According to this embodiment, therefore, an
20 effect equivalent to the provision of 60 ($= 20 \times 3$) keys is obtained. A touch-sensitive panel 616, which comprises a combination of a liquid-crystal screen and touch sensor, displays a separate setting screen for each mode. By touching a key displayed on the touch
25 panel 616, it is possible to make a variety of detailed settings.

Figs. 16A to 16C are diagrams illustrating examples of initial screens displayed on the touch panel 616 in a case where various function mode keys are pressed.

Figs. 16A, 16B and 16C respectively illustrate an
5 initial screen for a copying operation in a case where the copy mode key 603 has been pressed, an initial screen for a facsimile operation in a case where the facsimile mode key 604 has been pressed, and an initial
10 screen for a printer operation in a case where the printer mode key 605 has been pressed.

Thus, it is possible to execute processing that combines such functions as reading documents, printing images, generating images, sending and receiving images and saving images, with the focus of these operations
15 being the image input/output controller 3.

Communication between the formatter 4 and the image input/output controller 3 according to this embodiment will now be described in detail.

The formatter 4 and the image input/output
20 controller 3 are connected by signals illustrated in Fig. 7.

An ABUS signal indicates a CPU address bus and a DBUS signal indicates a CPU data bus. An MPRDY* signal gives notification of the fact that the image
25 input/output controller 3 has started, and an SPRDY* signal gives notification of the fact that the formatter

4 has started. A RESET* signal is a signal through which the image input/output controller 3 resets the formatter 4, and a VIDEO signal is an image-data signal. HSYNC* and VSYNC* signals are image-data horizontal and vertical synchronizing signals, respectively. A CLK signal is a synchronizing signal for when image data is output.

The timing of the SPRDY* signal output from the formatter 4 to the image input/output controller 3 and the timings of the MPRDY* and RESET* signals that enter the formatter 4 from the image input/output controller 3 will now be described with reference to Figs. 8A to 8C. Further, Fig. 8D indicates the meanings of symbols t_X , which represent the periods of time illustrated in Figs. 8A to 8C.

Fig. 8A illustrates the timing of each signal when power is introduced.

When power is introduced, the formatter 4 activates the SPRDY* signal upon elapse of a predetermined period of time (t_{PSP}). The image input/output controller 3 detects the activation of the SPRDY* signal and then activates the MPRDY* signal upon elapse of a predetermined period of time (t_{SMP}).

Fig. 8B illustrates the timing of each signal when the image input/output controller 3 has detected deactivation of the SPRDY* signal. This illustrates

operation in a case where the formatter 4 is subjected to hard reset (re-introduction of power) when it is operating normally. When the image input/output controller 3 detects deactivation of the SPRDY* signal, it activates the MPRDY* signal after a predetermined period of time (t_{SMI}). When activation of the SPRDY* signal is detected after a predetermined period of time (t_{MSP}), the image input/output controller 3 activates the MPRDY* signal again after a predetermined period of time (t_{SMP}).

Fig. 8C illustrates the timing of each signal when the image input/output controller 3 has issued the RESET* signal to the formatter 4. This illustrates operation in a case where, because of a fatal error that has occurred in the formatter 4, the formatter 4 is forcibly reset by an order from the image input/output controller 3.

When the image input/output controller 3 activates the RESET* signal for a predetermined period of time (t_{RW}), a CPU reset operation is performed in the formatter 4 and the formatter 4 attains a state in which power is re-introduced. Thereafter, in a manner similar to that when power is introduced in the usual manner, the formatter 4 activates the SPRDY* signal after a predetermined period of time (t_{RSP}). After the image input/output controller 3 has detected activation of the

SPRDY* signal, it activates the MPRDY* signal following elapse of the predetermined period of time (tSMP).

Described next will be the protocol of communication between the formatter 4 and image input/output controller 3. Figs. 9 to Figs. 11A, 11B are diagrams conceptually illustrating exchange of commands between the formatter 4 and image input/output controller 3. These diagrams will be described below.

The communication protocol has an ordinary hierarchical structure of the kind shown in Fig. 10. The physical layer indicates a physical interface. This is a layer for transferring the header and data of a network layer. The network layer is a layer having a header for performing packet control. A transport layer has the transmission source of a data transfer and a logical port of the transmission destination, etc., as a header. An application layer defines commands for implementing actual functions.

In the application layer, the formatter 4 and image input/output controller 3 each have a software module for each function. For example, there is a module of a printing sequence for image transfer back and forth, a module of the control panel for performing an exchange of operation/display using the control panel 6, and a module of a status monitor for performing an exchange of status information.

Fig. 11A is a diagram illustrating the data structure of the transport layer. The header is composed of a transmission-source port ID indicating the logical port of the source of a data transfer, a
5 transmission-destination port ID indicating the logical port of the destination of a data transfer, and a length field indicating the length of data. Commands actually exchanged are set in the data. Fig. 11B illustrates the port IDs and the corresponding logical port names.

10 Thus, client-server communication is performed between software modules in which the image input/output controller 3 is likened to a server and the formatter 4 is likened to a client.

Described next will be an exchange in the control
15 panel, which is one of the logical ports, that takes place between the formatter 4 and the image input/output controller 3. Fig. 12 is a diagram illustrating the control-panel sequence, and Fig. 13 illustrates commands that are actually exchanged.

20 After power is introduced, the formatter 4 sends the image input/output controller 3 an OpenConsoleReq command for setting up the control-panel sequence (step 1201 in Fig. 12). Fig. 13A illustrates the structure of the OpenConsoleReq command. OpenConsoleReq represents
25 the type of command, Datasize indicates the length of data that follows the command, and Language indicates

the language code used.

The image input/output controller 3 responds to this command by issuing an OpenConsoleRsp command (step 1202). Fig. 13B illustrates the structure of the

5 OpenConsoleRsp command. OpenConsoleRsp represents the type of command, Datasize indicates the length of data that follows the command, and Result indicates acceptance of OpenConsoleReq is OK or NG. OK is sent back if preparations for display on the control panel

10 have been completed and a display is possible. NG is sent back if display preparations have not been completed. In case of NG, the formatter 4 issues the OpenConsoleReq command again after a predetermined period of time.

15 If display on the control panel is OK, then the formatter 4 issues a DisplayReq command (step 1203) for requesting the display of an initial screen. When the formatter 4 subsequently requests display, it transmits the DisplayReq command. Fig. 13C illustrates the

20 structure of the DisplayReq command. Display indicates the type of command, Datasize the length of data that follows the command, FormatID the type of screen format and Data the detailed data of each screen format.

Fig. 13D illustrates an example of Data in a case

25 where a message is displayed in the message section of screen format 1 (Fig. 16C).

ItemType indicates the display type of screen format 1. If the display type is 0, this indicates display of a message only. If the display type is 1, this indicates display only of an item. In this case, 0 is set. Length indicates the length of the displayed message, Message the character string of the message, and MessagePriority the type of message. The message types are 0: ready; 1: error; 2: operator call; 3: service call.

10 After the request for display of the initial screen, the formatter 4 issues a KeyEnable command that enables acceptance of a key-input operation from the control panel 6 (step 1204). Fig. 13E illustrates an example of the KeyEnable command. KeyEnable indicates
15 the type of command.

If an input is made by pressing a key on the control panel 6, the image input/output controller 3 sends the formatter 4 the KeyInput command. Fig. 13F illustrates an example of the KeyInput command. KeyIn
20 indicates the command type, Datasize the length of data that follows the command, and InputType the type of key input. The key-input types are 0: function key; 1: item selection; 2: numerical input; 3: character input; etc. InputData indicates the data actually
25 entered.

This is usually followed by repeating this sequence

(steps 1203 to 1205). However, in a case where only the formatter 4 is placed in the state for re-introduction of power (hard reset) by an order from the formatter 4, it is necessary to perform an exchange for the purpose of halting the control-panel sequence temporarily. In such case the formatter 4 issues a CloseConsoleReq command (step 1206). Fig. 13G illustrates an example of the CloseConsoleReq. CloseConsoleReq indicates the command type, Datasize the length of data that follows the command, and Cause of Close the reason (e.g., hard reset) for halting the sequence. In response, the image input/output controller 3 sends back a CloseConsoleRsp command (step 1207). As a result, the control-panel sequence between the image input/output controller 3 and the formatter 4 is halted. Fig. 13H illustrates the format of CloseConsoleRsp.

Next, a process between the formatter 4 and the image input/output controller 3 in a case where a service call has occurred in the formatter 4 will be described with reference to Fig. 14.

In Fig. 14, (B) indicates control-panel processes within the image input/output controller 3, (A) other processes within the image input/output controller 3, (C) control-panel processes within the formatter 4, and (D) other processes within the formatter 4.

First, when a service call is generated in a

certain process within the formatter 4 (step 1401), a service-call display request is sent to the panel process (step 1402). Upon receiving the service-call display request from the certain process (step 1403),
5 the control-panel process sends the DisplayReq command to the control-panel process of image input/output controller 3 (step 1404). When issuance of the DisplayReq command ends, the formatter 4 halts all processes (step 1405). When the Display command is
10 received in the control-panel process of the image input/output controller 3 (step 1406), the display content is analyzed (step 1407) and a display is presented on the control panel (step 1408). In case of a service-call message display request, other processes
15 of the image input/output controller 3 are notified so as to halt communication with the formatter 4 (step 1409). The process that has received termination of communication (step 1410) and the control-panel process execute processing for terminating communication with
20 the formatter 4 (step 1411). In a case where communication with the formatter 4 is halted in an ordinary sequence, the procedure indicated by steps 1206 and 1207 in Fig. 12 is followed. When a service call is generated, however, communication is terminated at this
25 time.

Reference will now be had to Figs. 17A-17D and 18

to describe processing (steps 1412 and 1413) in a case where a key input operation (pressing of the printer mode key 605) for displaying a screen on the formatter 4 while communication with the formatter 4 is halted is carried out. When the printer mode key 605 is pressed, first it is determined whether the screen currently being displayed is the screen for the printing mode or the screen for some other mode (step 1801). If the screen for the printing mode is already being displayed, processing is exited at this time. If the screen for another mode is being displayed, it is determined whether communication with the formatter 4 is in progress (step 1802). If communication with the formatter 4 is being performed in the usual manner, a KeyIn command is issued (step 1806) and processing is terminated.

If communication with the formatter 4 has been halted, it is determined whether the formatter 4 is undergoing a restart operation (step 1803). If the formatter 4 is not undergoing restart, notification is given of the fact that a service call has been generated, a screen (Fig. 17A) for initiating the restart operation is displayed (step 1805) and processing is terminated.

If the formatter 4 is undergoing restart, a screen (Fig. 17B) for notifying that restart is in progress is

displayed and processing (step 1804) is terminated. It should be noted that even when the formatter 4 is involved in a service call or is being restarted, the other functions continue to operate in the image input/output controller 3 and it is therefore possible to make a transition to another mode screen. Fig. 17D illustrates an example of a screen when the facsimile mode key 604 is pressed while the formatter 4 is involved in a service call or is being restarted.

10 With reference again to Fig. 14, when initiation of restart is designated using the screen of Fig. 17A, the reset process of the image input/output controller 3 is so notified (step 1414). The reset process receives the reset designation (step 1415) and sends the RESET* signal to the formatter 4 (step 1416).

When the formatter 4 receives the RESET* signal, the CPU is reset, the program is rebooted and each process is started up (step 1417).

Communication initialization processing is
20 thenceforth executed between the formatter 4 and the image input/output controller 3 in a manner similar to that when power is introduced in the usual fashion (step 1418). When processing ends in the initialization of the formatter 4 (step 1419), each process is so notified
25 (step 1419). Upon receiving this notification, the panel process sends the image input/output controller 3

the OpenConsoleReq command and starts the control-panel sequence (step 1420).

In accordance with the above-described procedure, if a fatal error requiring a service call occurs in the
5 formatter 4 which generates image data from input PDL data, a request to present a display indicative of this fact is issued to the image input/output controller 3. If the image input/output controller 3 receives this request, therefore, the controller presents the display
10 in response to this request, halts communication with the formatter 4 and sends a reset signal to the formatter 4. Thus, only the formatter 4 is initialized, the error condition is eliminated without shutting down the main power supply and only the printer function is
15 restarted. The other functions, e.g., the scanner and facsimile function, are not initialized and continue to operate.

[Second Embodiment]

In the first embodiment, notification of the fact
20 that a service call has been generated in the formatter 4 is given by the content of the message display sent from the formatter 4, and communication is then terminated. With this method, however, communication cannot be terminated normally if the process shuts down
25 in the formatter 4 before the display request is issued. In such case it is possible to adopt an arrangement in

which monitoring is performed at all times to determine that the formatter 4 is operating normally and communication is halted immediately if an abnormality is sensed, whereby only the formatter 4 is restarted in a manner similar to that of the first embodiment.

To accomplish this, use is made of, e.g., a status monitor, which is a logical port between the image input/output controller 3 and the formatter 4, and a StatusReq command for acquiring the status of the formatter 4 is issued by the image input/output controller 3 constantly at regular intervals while the formatter 4 is starting up. While it is operating normally, the formatter 4 sends back a StatusRsp command to the image input/output controller 3. If after it issues the StatusReq command a predetermined period of time elapses before the StatusRsp command is sent back, the image input/output controller 3 judges that a fatal error has occurred in the formatter 4, halts communication with the formatter 4 and displays the screen for resetting the formatter 4. This is followed by executing a procedure similar to that from step 11 onward in Fig. 14.

According to this procedure, even if the formatter 4 cannot notify the image input/output controller 3 of the occurrence of a fatal error, the image input/output controller 3 senses the abnormality that occurred in the

formatter 4 and then restarts the formatter. As a result, the error can be eliminated without affecting functions other than the formatter function.

[Effects of the Invention]

5 Thus, in accordance with the present invention, as described above, even if a printing function develops a fatal error, recovery of the printing function can be achieved, without shutting down the main power supply, in such a manner that functions that do not utilize the
10 printing function are unaffected.

 As many apparently widely different embodiments of the present invention can be made without departing from the spirit and scope thereof, it is to be understood that the invention is not limited to the specific
15 embodiments thereof except as defined in the appended claims.

WHAT IS CLAIMED IS:

1. An image output apparatus comprising:
image generating means for generating image data
based upon input data; and
5 control means for receiving and controlling output
of the image data that has been generated by said image
generating means;
wherein said control means detects occurrence of an
error in said image generating means and, when an error
10 has been detected, issues said image generating means an
order to execute initialization.
2. The apparatus according to claim 1, wherein said
image generating means detects the occurrence of a fatal
error and so notifies said control means, whereby said
15 control means detects the occurrence of an error in said
image generating means.
3. The apparatus according to claim 1, wherein said
control means judges that an error has occurred in said
image generating means if an instruction that has been
20 transmitted to said image generating means is not
responded to in a predetermined period of time.
4. The apparatus according to claim 1, wherein said
control means, which has detected the occurrence of an
error in said image generating means, halts
25 communication with said image generating means and
notifies an operator of occurrence of the error by a

display or sound before the order to execute
initialization is issued to said image generating means.

5. The apparatus according to claim 1, further
comprising conversion means for reading in an image and
5 converting the image to image data.

6. The apparatus according to claim 1, further
comprising means for sending and receiving image data
via a communication line.

7. The apparatus according to claim 1, further
10 comprising input means for allowing an operator to
perform an input;

wherein when an order to reset to recover from an
error is input by said input means in response to
occurrence of the error, said control means issues said
15 image generating means an order to execute
initialization.

8. A method of controlling an image output apparatus
having image generating means for generating image data
based upon input data, and control means for receiving
20 and controlling output of the image data that has been
generated by said image generating means, said method
comprising:

a detection step of detecting occurrence of an
error in the image generating means; and
25 an initialization step of issuing the generating
means an order to execute initialization when an error

has been detected at said detection step.

9. The method according to claim 8, wherein at said initialization step, an error is regarded as having occurred in the image generating means if an instruction
5 that has been transmitted to said image generating means is not responded to in a predetermined period of time.

10. The method according to claim 8, wherein if occurrence of an error in the image generating means is detected, communication with said image generating means
10 is halted and an operator is notified of occurrence of the error by a display or sound before the order to execute initialization is issued to said image generating means in said initialization step.

11. The method according to claim 8, further comprising
15 a conversion step of reading in an image and converting the image to image data.

12. The method according to claim 8, further comprising a method of sending and receiving image data via a communication line.

20 13. The method according to claim 8, wherein when an order to reset to recover from an error is input by input means, which is for allowing an operator to perform an input, in response to occurrence of the error, an order to execute initialization is issued to
25 the image generating means at said initialization step.

14. A computer-readable storage medium storing a

program for executing each step of the method described in claim 8.

15. A computer program product capable of being loaded in a memory within a digital computer, said program
5 product including program code for executing each step of the method described in claim 8.

16. The apparatus according to claim 1, wherein said image generation means includes input means for inputting the input data.

ABSTRACT OF THE DISCLOSURE

Disclosed is an image processing apparatus in which image data is generated by a formatter based upon PDL data from a host computer and the image data is output
5 from a printer via an image input/output controller. The apparatus has a scanner unit and a facsimile unit and is capable of transmitting data and of scanning an image while printing is in progress. The formatter senses a service call arising from an error or the like
10 and sends the image input/output controller a request to display this fact. As a result of detection of the error, the image input/output controller halts communication with the formatter and sends a RESET signal to the formatter, whereby the formatter is
15 initialized. Even if an abnormality occurs in a printing function, therefore, recovery of the printing function can be achieved without affecting the scanner and facsimile functions.

FIG. 1

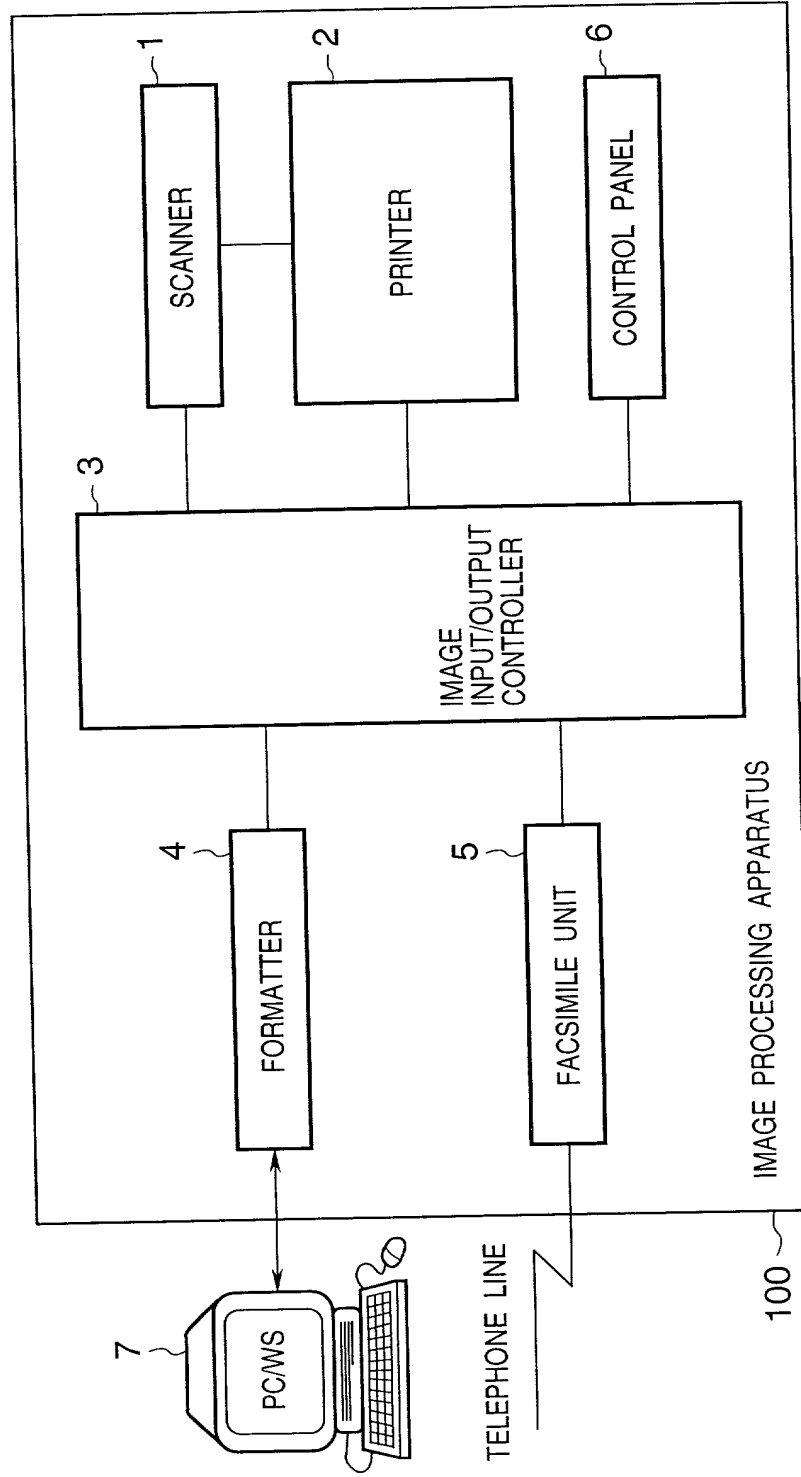


FIG. 2

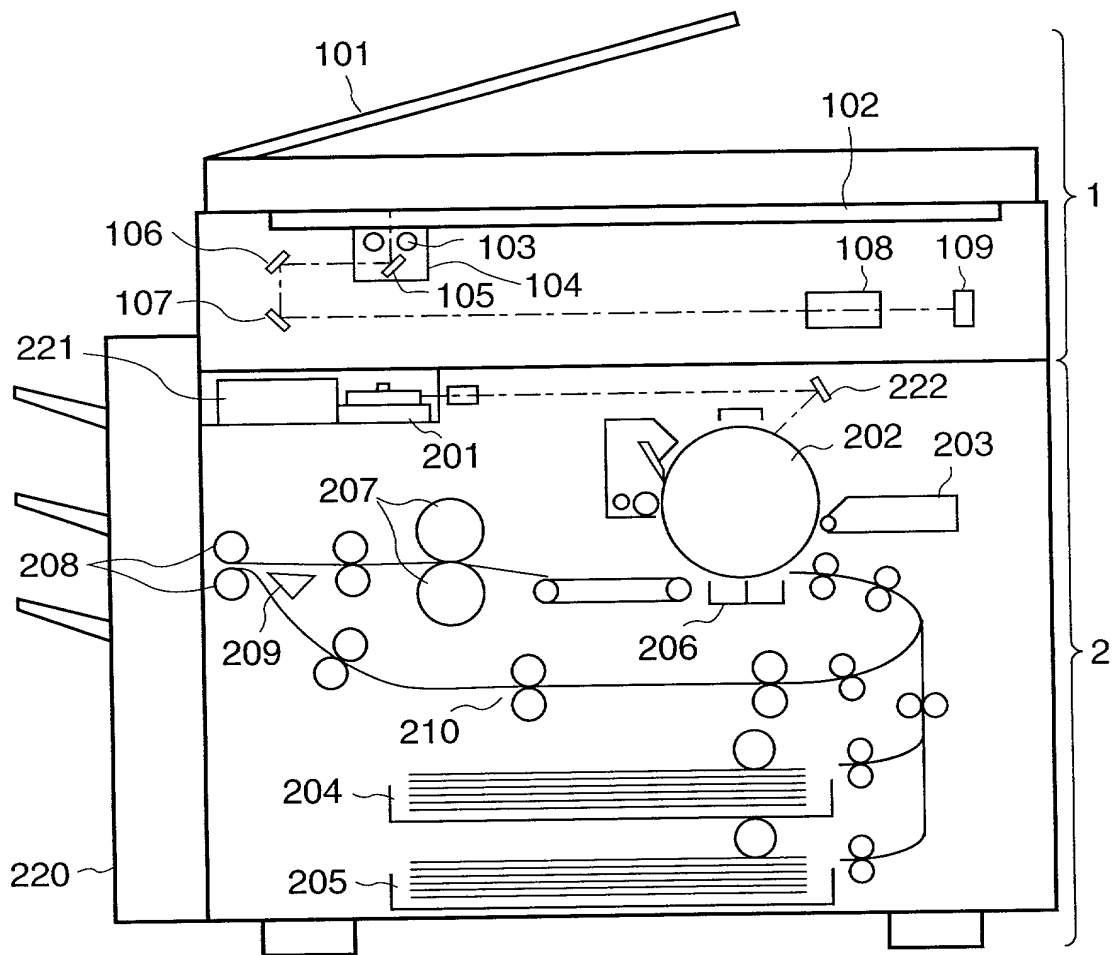


FIG. 3

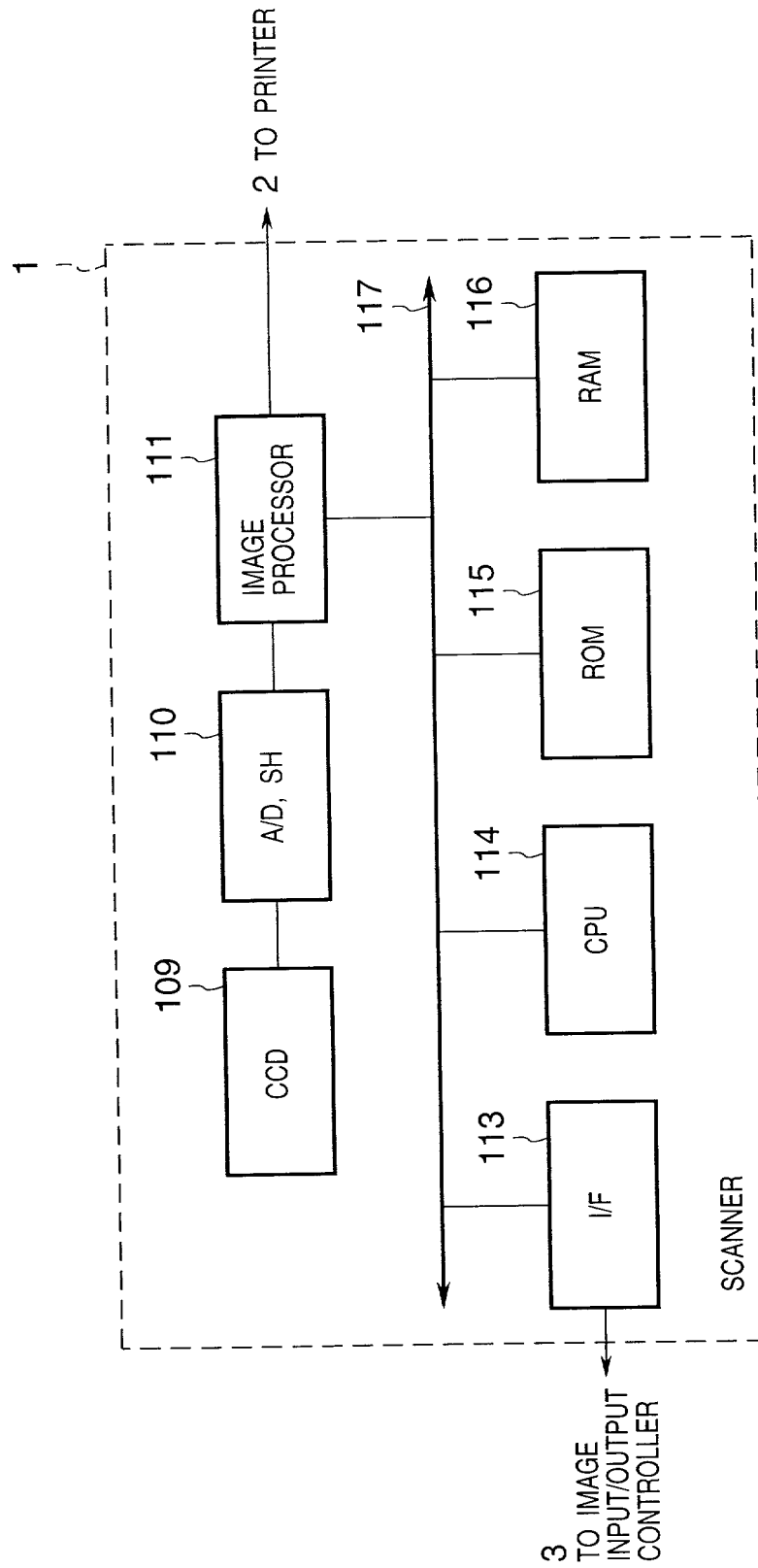


FIG. 4

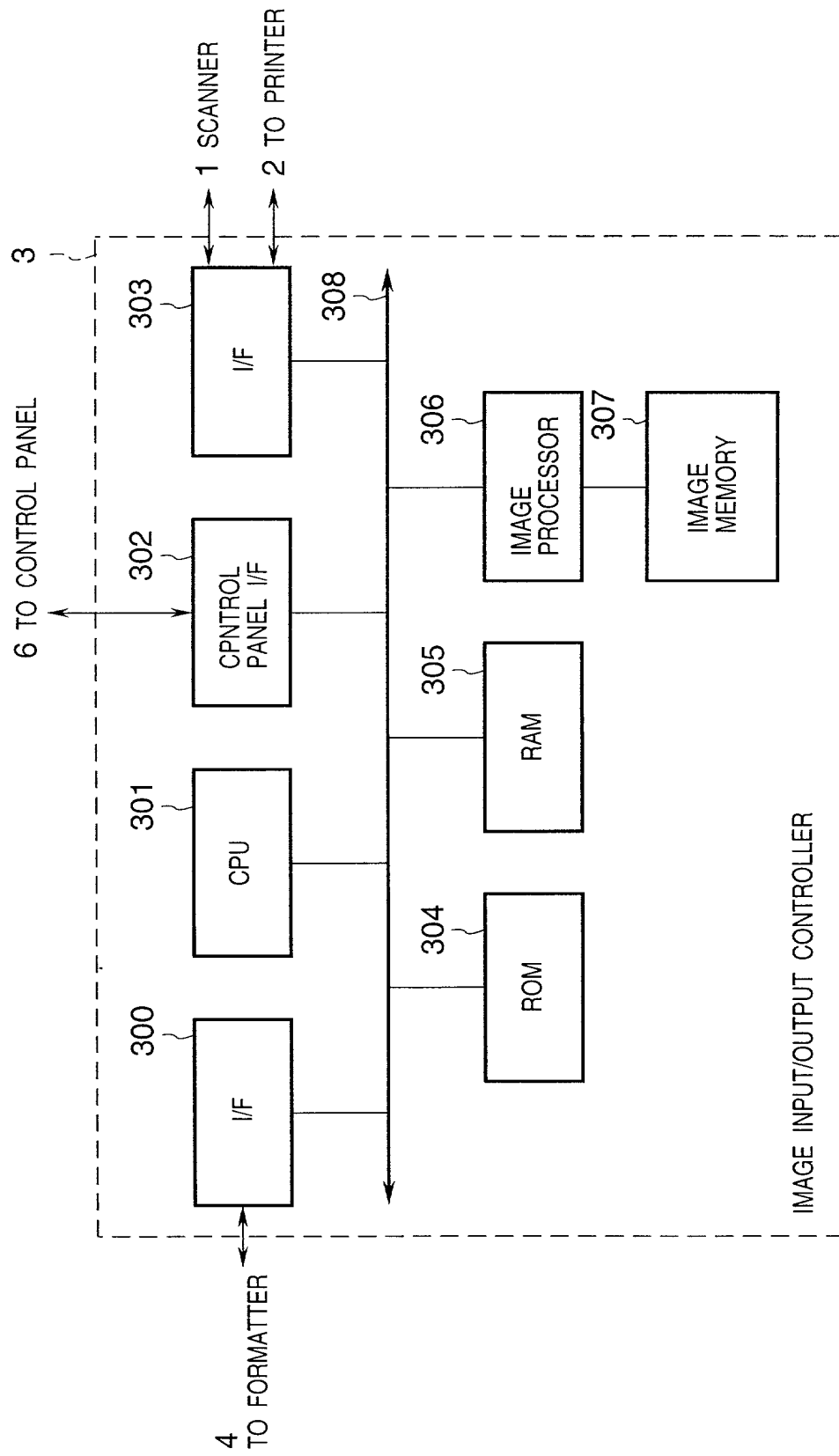


FIG. 5

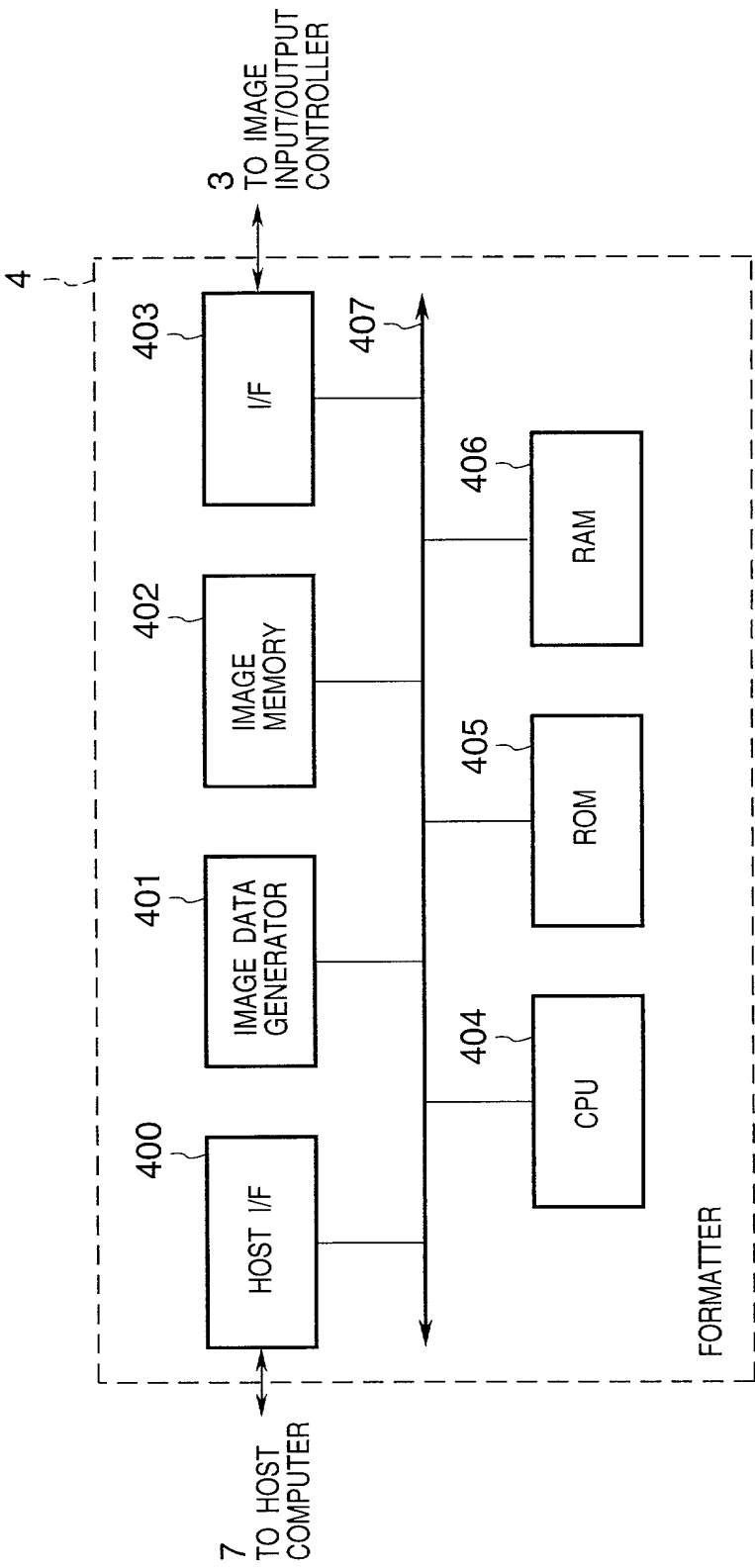


FIG. 6

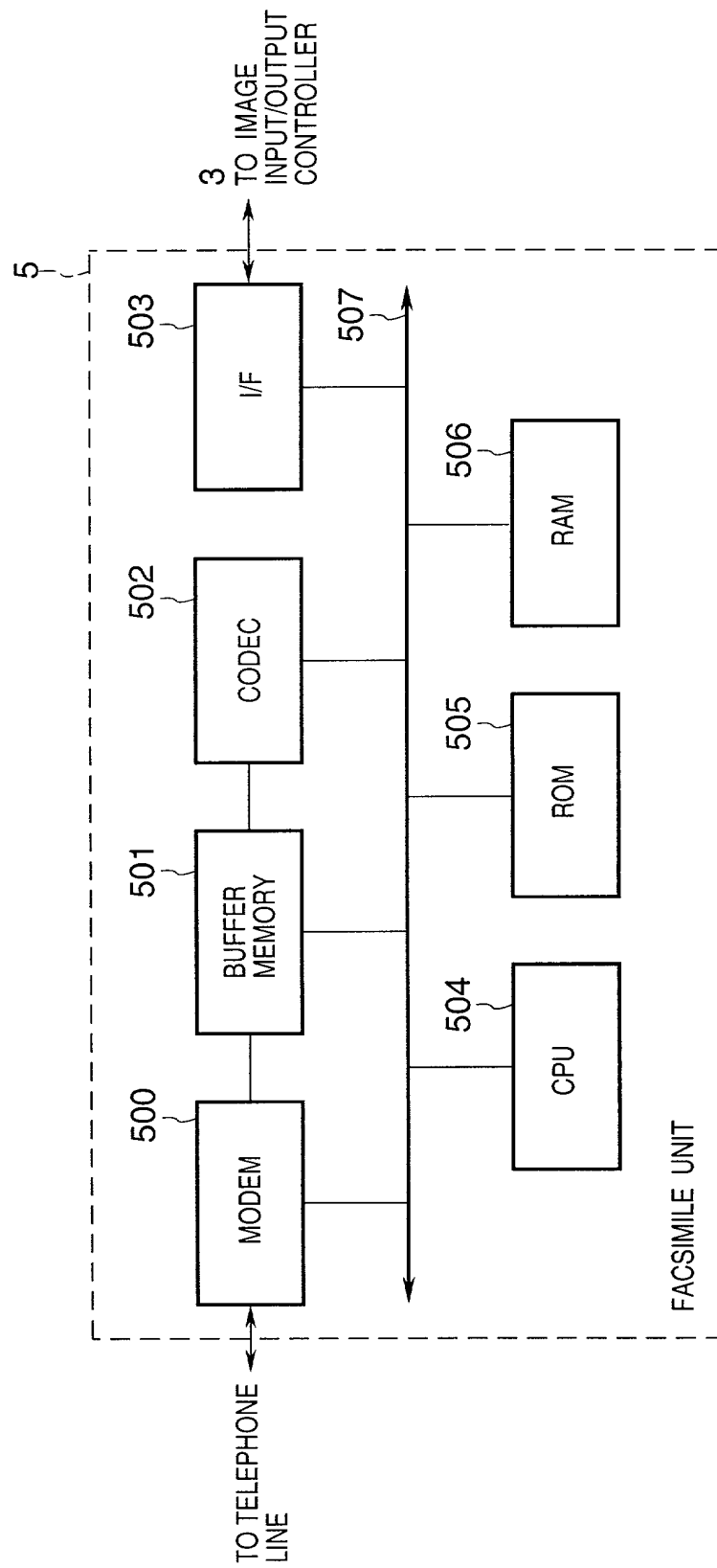


FIG. 7

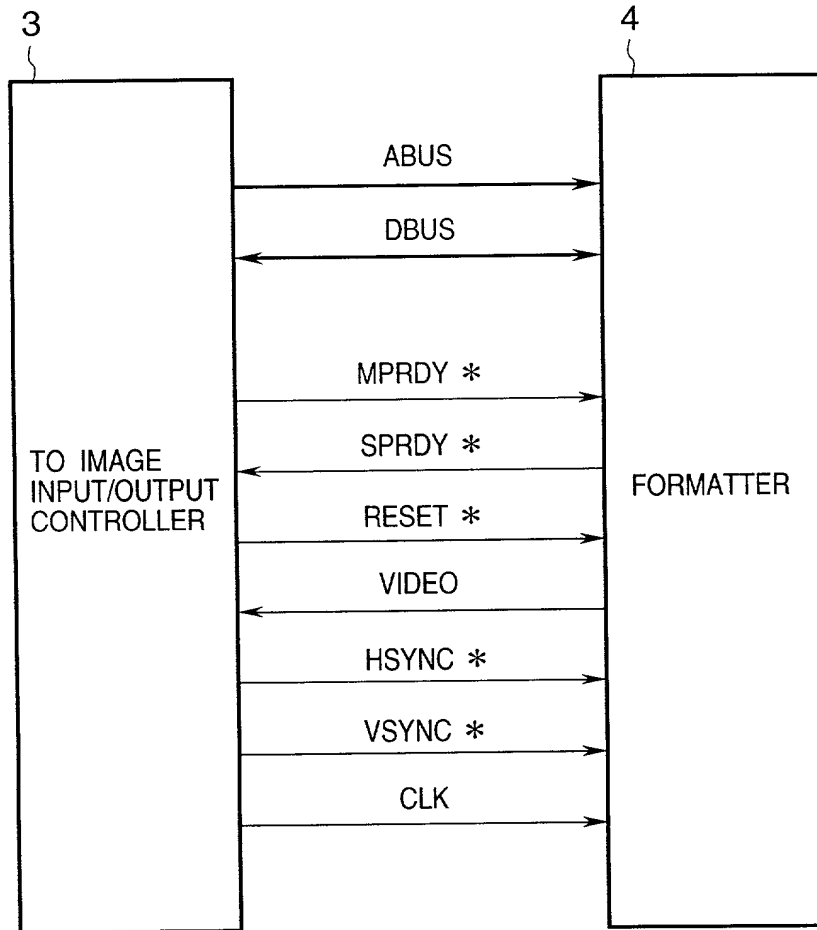
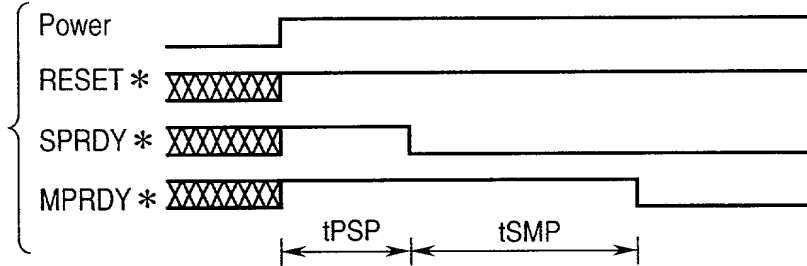
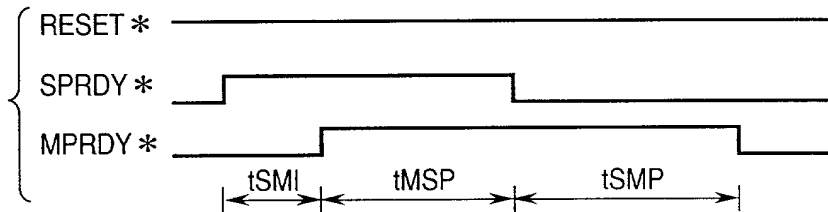
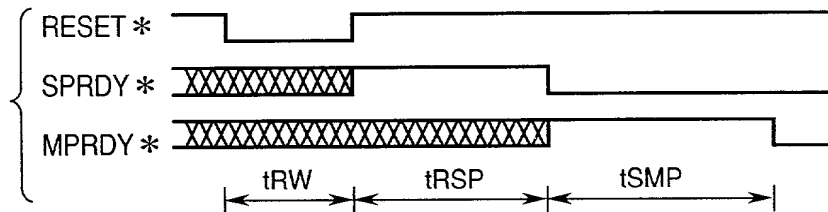


FIG. 8A**FIG. 8B****FIG. 8C****FIG. 8D**

Symbol	Description	Min.	Max.
tPSP	Power On to SPRDY * falling	100us	-
tSMP	SPRDY * falling to MPRDY * falling	100us	-
tSMI	SPRDY * rising to MPRDY * rising	1s	-
tMSP	SPRDY * rising to SPRDY * falling	100us	-
tRW	RESET * Pulse Width	50ms	-
tRSP	RESET * rising to SPRDY * falling	100us	-

FIG. 9

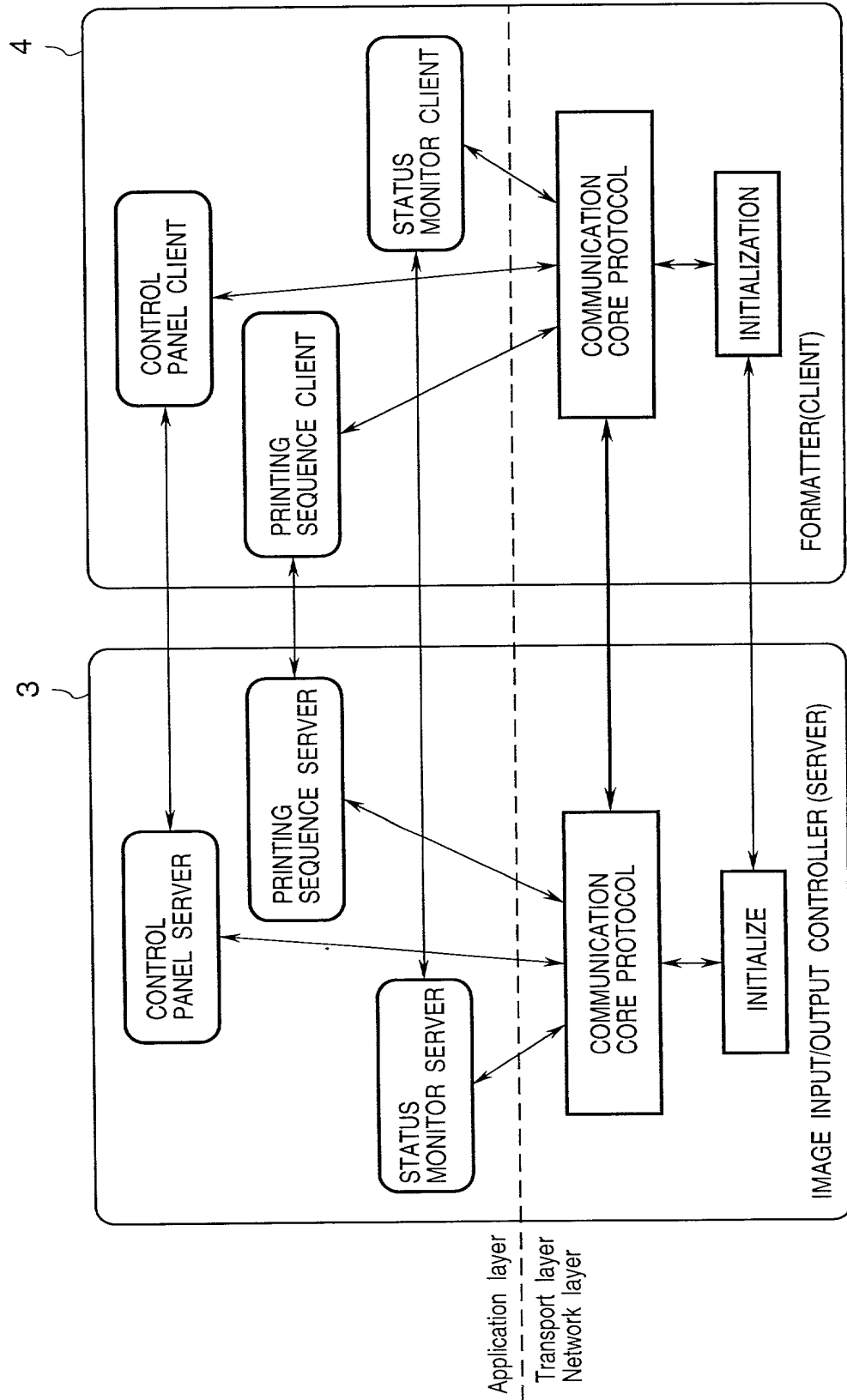


FIG. 10

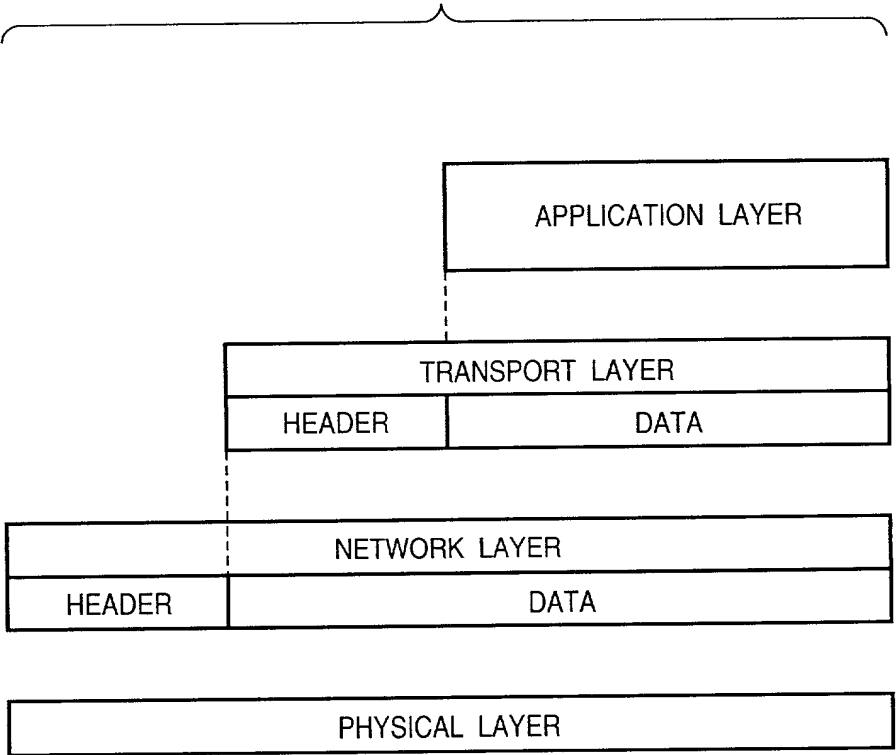


FIG. 11A

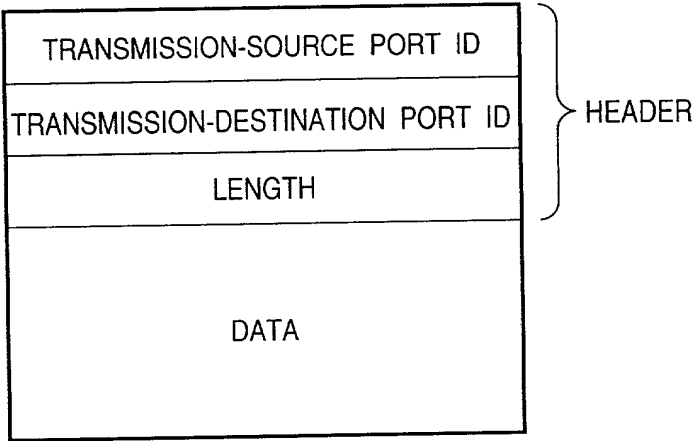


FIG. 11B

LOGICAL PORT NAME	Port ID
CONTROL PANEL	0x0010
STATUS MONITOR	0x0020
PRINT REQUEST	0x0030

FIG. 12

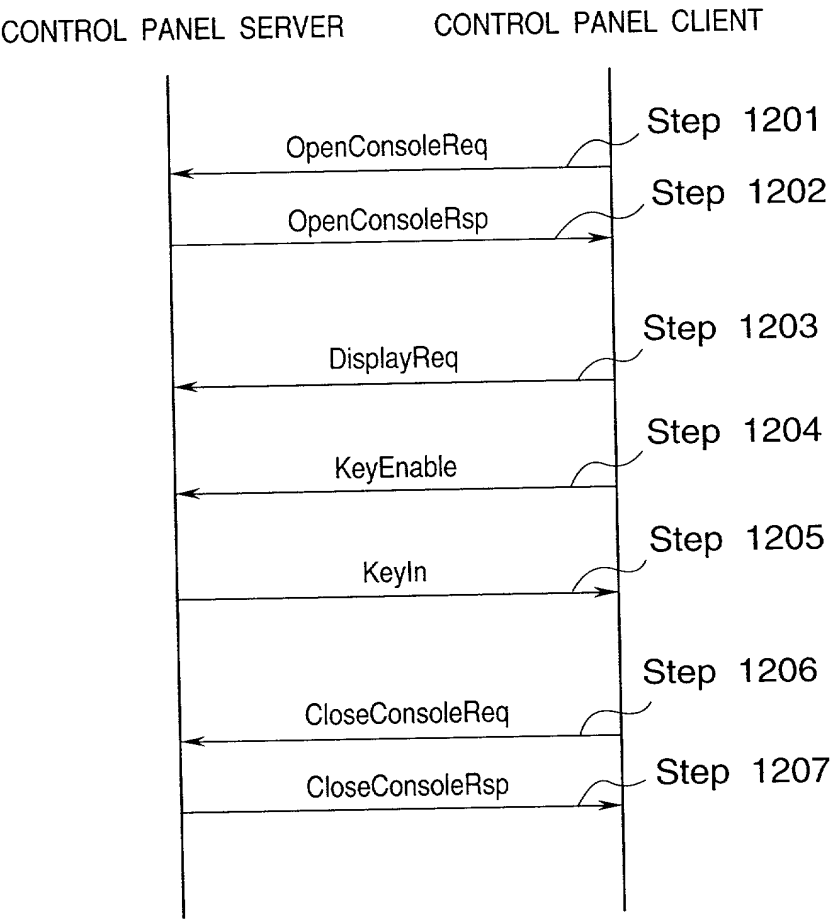


FIG. 13A

OpenConsoleReq
DataSize
Language

FIG. 13B

OpenConsoleRsp
DataSize
Result

FIG. 13C

DisplayReq
DataSize
FormatID
Data

FIG. 13D

Item Type
Length
Message
Message Priority

FIG. 13E

KeyEnable

FIG. 13F

KeyIn
DataSize
InputType
InputData

FIG. 13G

CloseConsoleReq
DataSize
Cause of close

FIG. 13H

CloseConsoleRsp

FIG. 14

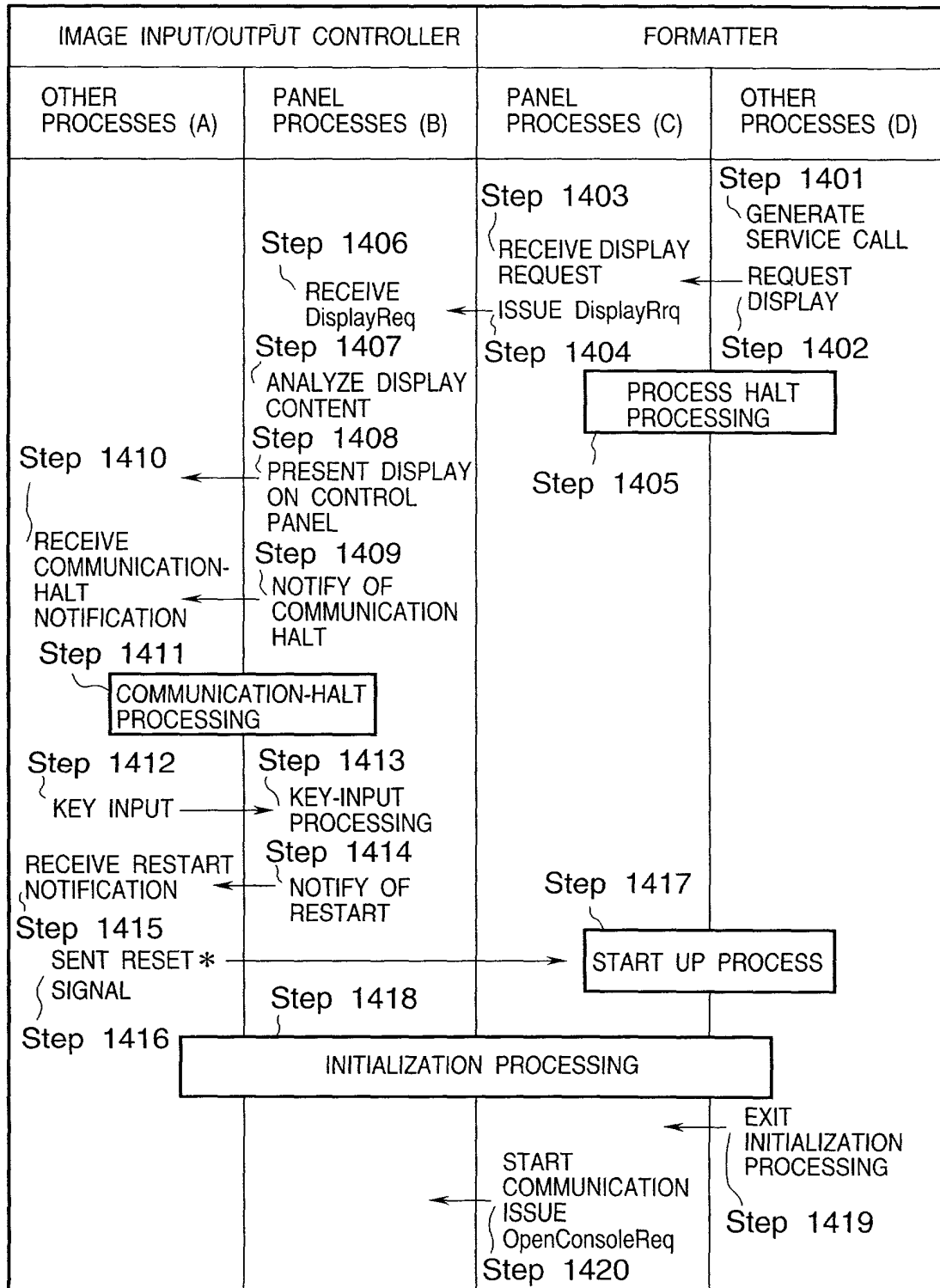


FIG. 15

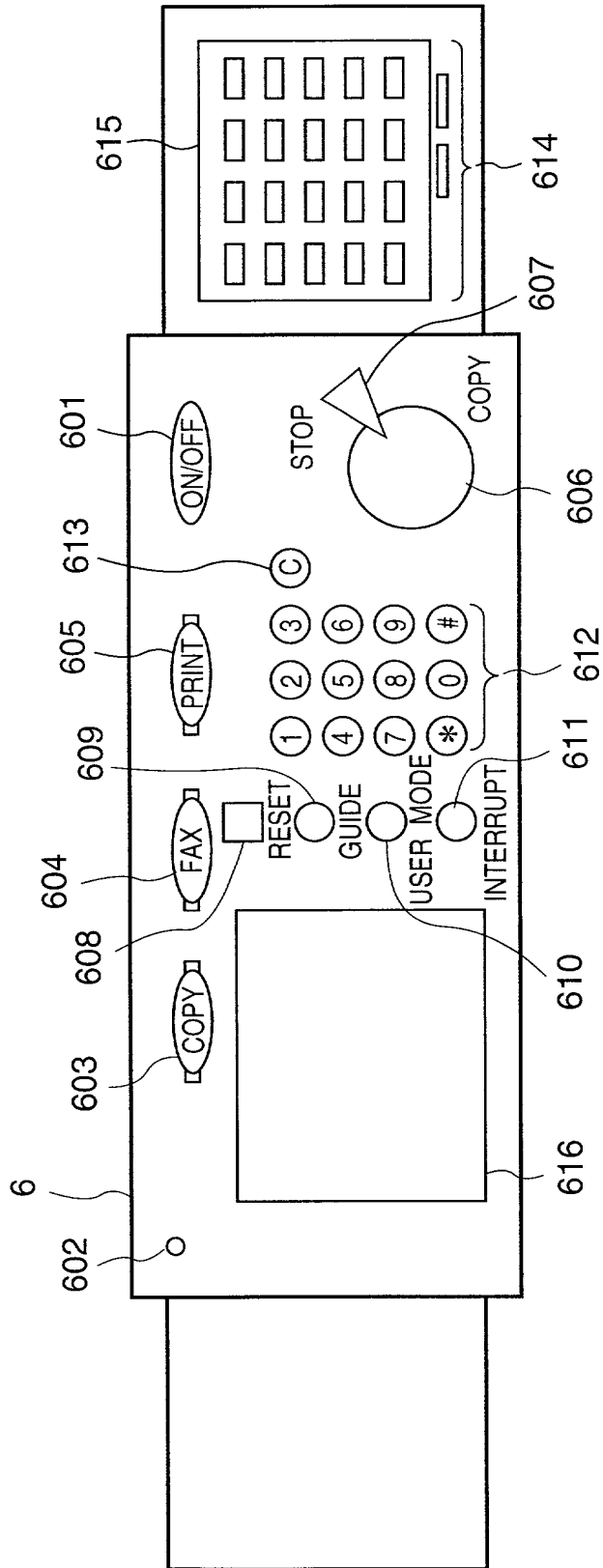
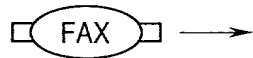


FIG. 16A



MAKE COPY				
100 %		A4		
RE- DUCE	SAME SIZE	EN- LARGE	SELECT PAPER	
ZOOM		<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>		
		LIGHTER	AUTOMATIC	DARKER
SORTER	DOUBLE- SIDED	CHAR- ACTERS	CHARACTERS/ PHOTOGRAPH	PHOTO- GRAPH
				<input type="checkbox"/> APPLICATION MODE <input type="checkbox"/>

FIG. 16B



SEND	06/15 12:21
☎ =	
STANDARD : USUAL : CHARACTER AUTOMATIC RECEIVE	
RE- SOLUTION : DENSITY : IMAGE QUALITY	<input type="checkbox"/> DIRECT
	<input type="checkbox"/> COPY COMPLETED STAMP
ABBREVIATED DIALING	ON- HOOK REDIAL
<input type="checkbox"/> APPLICATION MODE <input type="checkbox"/>	

FIG. 16C



00 PRINT A4		
OPERATING MODE	PRIORITY EMULATION	PRINTER
UTILITY	SET-UP	
SELECT PAPER FEED	EJECT	
DOUBLE-SIDED	RESET	
ON-LINE	OFF-LINE	

FIG. 17A

SERVICE CALL RESTART PRINTER MODE?		<input type="checkbox"/>
<input type="button" value="START"/>		<input type="checkbox"/>
		RE- START
		<input type="checkbox"/>

FIG. 17B

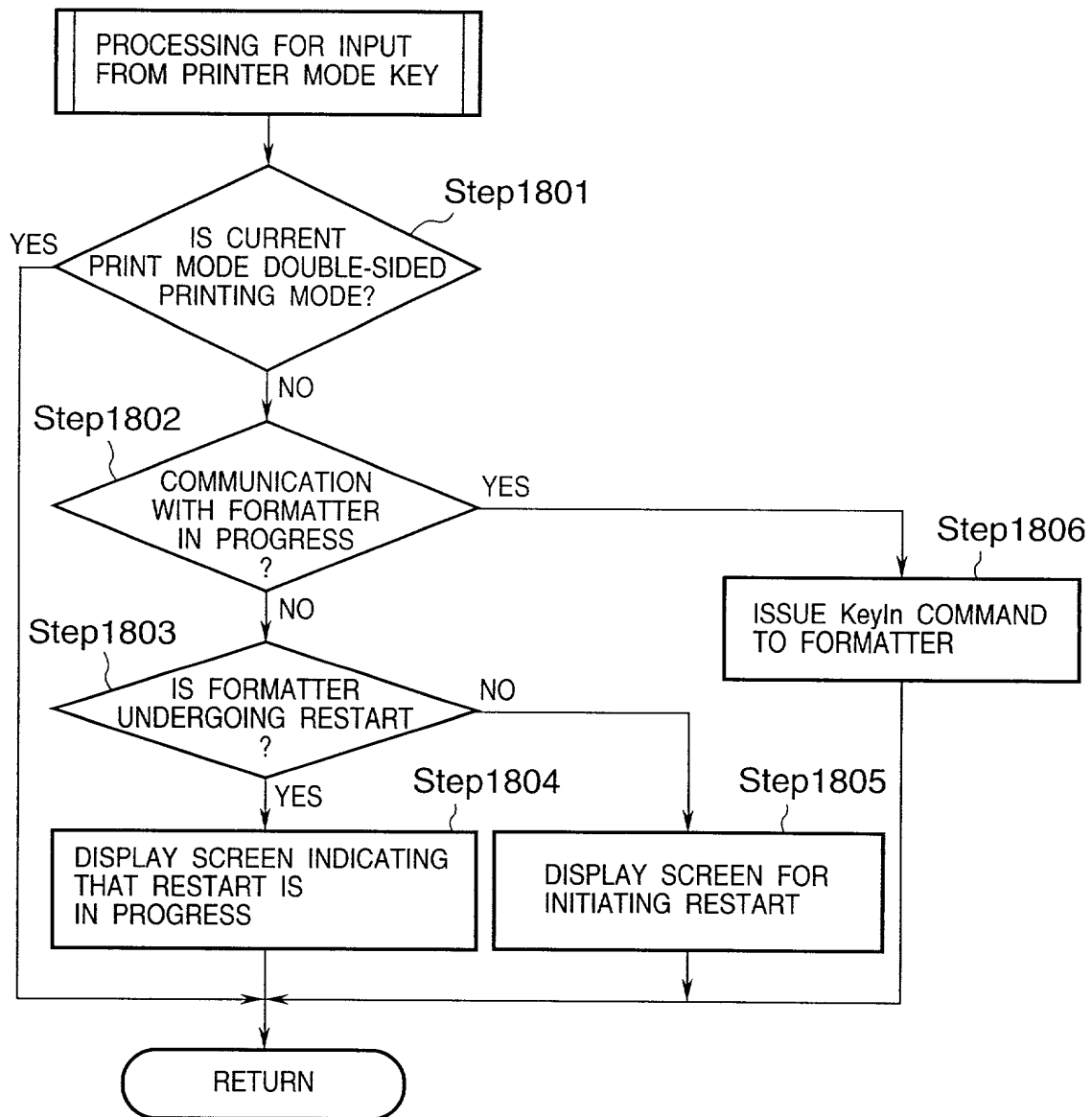
PRINTER PORT IS STARTING. PLEASE WAIT.		<input type="checkbox"/>
<input type="button" value="START"/>		<input type="checkbox"/>
		RE- START
		<input type="checkbox"/>

FIG. 17C

00 PRINT A4		
OPERATING MODE	PRIORITY EMULATION	PRINTER
UTILITY	SET-UP	
SELECT PAPER FEED	EJECT	
DOUBLE- SIDED	RESET	
ON-LINE	OFF-LINE	

FIG. 17D

SEND		06/15 12:21	
STANDARD : USUAL : CHARACTER		AUTOMATIC RECEIVE	
RE- SOLUTION : DENSITY : IMAGE QUALITY		<input type="checkbox"/> DIRECT	
		<input type="checkbox"/> COPY COM- PLETED STAMP	
ABBREVIATED DIALING	ON- HOOK	RE- DIAL	
			<input type="checkbox"/> APPLICATION MODE <input type="checkbox"/>

FIG. 18

COMBINED DECLARATION AND POWER OF ATTORNEY
FOR PATENT APPLICATION

(Page 1)

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name;

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

IMAGE OUTPUT APPARATUS AND METHOD OF CONTROLLING SAME

the specification of which [X] is attached hereto. [] was filed on _____

as United States Application No. or PCT International Application No. _____

and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR §1.56.

I hereby claim foreign priority benefits under 35 U.S.C. §119(a)-(d) or §365(b), of any foreign application(s) for patent or inventor's certificate, or §365(a) of any PCT international application which designates at least one country other than the United States, listed below and have also identified below any foreign application for patent or inventor's certificate, or PCT international application having a filing date before that of the application on which priority is claimed:

<u>Country</u>	<u>Application No.</u>	<u>Filed (Day/Mo./Yr.)</u>	<u>(Yes/No)</u> <u>Priority Claimed</u>
JAPAN	11-009909	18/01/1999	Yes

I hereby appoint the practitioners associated with the firm and customer number provided below to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith, and direct that all correspondence be addressed to the address associated with that Customer Number:

FITZPATRICK, CELLA, HARPER & SCINTO
Customer Number: 05514

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full Name of Sole or First Inventor Masahiro IWADATE

Inventor's signature Masahiro Iwadate

Date December 24, 1999 Citizen/Subject of Japan

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